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(54) [Title of the Invention] PRINTER SYSTEM, PRINT CONTROL  
METHOD AND COMPUTER-READABLE MEMORY

(57) [Abstract]

[Object] To provide a printer system, a print control method and a computer-readable memory permitting more user-friendly output by performing appropriate processing even when an output limit is reached during printing a series of documents.

[Solving Means] For each user of the printer system, an upper limit number of prints and the cumulative number of printed sheets to the present are retained, and operations to be carried out when the cumulative number of new printed sheets determined from the number of new printing runs exceeds the upper limit number of printed sheets (for example, change in printing mode; printing is continued if the change is within a prescribed allowable range) are set

in advance. When carrying out printing in accordance with a printing instruction from the host on the basis of the upper limit number of printed sheets and the cumulative number of printed sheets, if the cumulative number of new printed sheets is determined to exceed the upper limit number of printed sheets, control is conducted so as to permit achievement of a previously set printing operation.

[Claims]

[Claim 1] A printer system in which a host and a printer are mutually connected via a network, comprising:

reception means which receives a printing instruction from said host;

memory means which stores the upper limit number of printed sheets that said printer is allowed to print and the cumulative number of printed sheets to the present, for each user;

determining means which determines whether or not the cumulative number of new printed sheets exceeds said upper limit number of printed sheets when conducting printing in accordance with said printing instruction on the basis of said upper limit number of printed sheets and said cumulative number of printed sheets;

setting means which sets in advance printing operations to be carried out when said cumulative number of new printed sheets exceeds said upper limit number of printed sheets; and

print controlling means which performs control so as to cause the printer to carry out printing operation set by said setting means when said cumulative number of new printed sheets exceeds said upper limit number of printed sheets, in accordance with the result of determination by said determining means.

[Claim 2] The printer system according to claim 1, wherein said printing operations set by said setting means comprises:

a first operation of comparing said cumulative number of new printed sheets and the prescribed allowable value of determine whether or not a former exceeds the latter, and determining whether or not said printing operation is to be continued in accordance with the result of said comparison; or

a second operation of unconditionally discontinuing said printing operation; or

a third operation of conducting said printing operation by changing the printing mode leading to a decrease in the consumption of recording medium.

[Claim 3] The printer system according to claim 2, wherein said printing mode includes a mode of reducing an image to be printed in a page on the recording medium in size, and printing a plurality of images in a page of said recording medium.

[Claim 4] The printer system according to claim 1, further comprising:

comparing means for comparing the processing capability of said printer and the number of printed sheets required when conducting printing in accordance with said printing instruction; and

selecting means for selecting whether or not printing according to said printing instruction pursuant to the result of comparison by said comparing means is to be continued, or discontinued.

[Claim 5] A print controlling method in a printer system in which a host and a printer are mutually connected via a network, comprising:

a storing step of storing the upper limit number of printed sheets that said printer is allowed to print and the cumulative number of printed sheets to the present for each user of said printer system;

a setting step of setting in advance the printing operations to be carried out when the cumulative number of new printed sheets determined from the number of printing runs conducted in the new printing operation exceeds said upper limit number of printed sheets;

a reception step of receiving a printing instruction from said host;

a determining step of determining whether or not the cumulative number of new printed sheets exceeds said upper limit number of printed sheets when conducting printing according to said printing instruction, on the basis of said upper limit number of printed sheets and said cumulative number of printed sheets; and

a controlling step of performing control so as to carry

out the printing operation set in said setting step when the cumulative number of new printed sheets exceeds said upper limit number of printed sheets, in accordance with the result of determination made in said determining step.

[Claim 6] A computer-readable memory which stores a print controlling program executed in a printer system in which a host and a printer are mutually connected via a network, comprising:

a code executing previously set processing the printing operation to be carried out when the cumulative number of new printed sheets determined from the number of new printing runs exceeds said upper limit number of printed sheets, on the basis of the upper limit number of printed sheets that the printer is allowed to print and the cumulative number of printed sheets to the present for each user of said printer system stored in a prescribed recording medium;

a code which receives a printing instruction from said host;

a code which executes processing of determining whether or not the cumulative number of new printed sheets exceeds said upper limit number of printed sheets when carrying out printing in accordance with said printing instruction on the basis of said upper limit number of printed sheets and said cumulative number of printed sheets; and

a code which executes processing of conducting control so as to carry out said set printing operation when said cumulative number of new printed sheets exceeds said upper limit number of printed sheets, in accordance with the result of said determination.

[Claim 7] A printer system in which a host and a printer are mutually connected via a network, comprising:

reception means which receives a printing instruction from said host;

memory means which stores the upper limit number of printed sheets that said printer is allowed to print and the cumulative number of printed sheets to the present, for each user;

comparing means which,, prior to executing said printing instruction, compares said upper limit number of printed sheets and said cumulative number of printed sheets to the present; and

display means which does not execute said printing instruction when the cumulative number of printed sheets is determined, as a result of said comparison, to exceed said upper limit number of printed sheets, and displays a message to the effect that printing is not possible.

[Claim 8] The printer system according to claim 7, wherein said comparing means further compares said upper limit number of printed sheets and the cumulative number of new

printed sheets obtained when conducting printing in accordance with said printing instruction; and

said display means does not execute said printing instruction when the cumulative number of printed sheets is determined, as a result of said comparison, to exceed said upper limit number of printed sheets, and displays a message to the effect that printing is not executable.

[Claim 9] A print controlling method in a printer system in which a host and a printer are mutually connected via a network, comprising:

a storing step of storing the upper limit number of printed sheets that the printer is allowed to print and the cumulative number of printed sheets to the present for each user of said printer system;

a reception step of receiving a printing instruction from said host;

a comparing step of comparing, prior to executing said printing instruction, said upper limit number of printed sheets and the cumulative number of printed sheets to the present; and

a displaying step of not executing said printing instruction when the cumulative number of printed sheets is determined, as a result of said comparison, to exceed said upper limit number of printed sheets, and displaying a message to the effect that printing is not executable.



[Claim 10] A computer-readable memory which stores a print controlling program executed in a printer system in which a host and a printer are mutually connected via a network, comprising:

a code executing processing of storing the upper limit number of printed sheets that said printer is allowed to print and the cumulative number of printed sheets to the present for each printer system;

a code executing processing of receiving a printing instruction from said host;

a code executing processing of comparing, prior to executing said printing instruction, said upper limit number of printed sheets and the cumulative number of printed sheets to the present; and

a code executing processing of not executing said printing instruction when the cumulative number of printed sheets is determined, as a result of said comparison, to exceed said upper limit number of printed sheets, and displaying a message to the effect that printing is not executable.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention] The present invention relates to a printer system, a print controlling method, and a computer-readable memory. More particularly, the present

invention relates to a printer system, a print controlling method and a computer-readable memory for conducting printing in accordance with a printing instruction from a computer connected to a network.

[0002]

[Description of the Related Art] Printers or copying machines used in offices have conventionally been managed and administered by providing a number of print output sheets for each department.

[0003]

[Problems to be Solved by the Invention] In the above-mentioned conventional case, when the limit number of sheets is reached during printing, printout has been discontinued unconditionally. Printout has become impossible thereafter. For example, output of a series of documents could not be completed, thus causing inconveniences for the user.

[0004] The present invention was developed in view of the above-mentioned conventional case, and has an object to provide a printer system, a print controlling method, and a computer-readable memory which permit more friendly print output by carrying out appropriate processing even when a output limit is reached during printing of a series of documents.

[0005]

[Means for Solving the Problems] The printer system of the

present invention for achieving the above-mentioned object has the following configuration.

[0006] More specifically, the printer system of the present invention, in which a host and a printer are mutually connected via a network, comprising: reception means which receives a printing instruction from the host; memory means which stores the upper limit number of printed sheets that the printer is allowed to print and the cumulative number of printed sheets to the present, for each user; determining means which determines whether or not the cumulative number of new printed sheets exceeds the upper limit number of printed sheets when conducting printing in accordance with the printing instruction on the basis of the upper limit number of printed sheets and the cumulative number of printed sheets; setting means which sets in advance printing operations to be carried out when the cumulative number of new printed sheets exceeds the upper limit number of printed sheets; and print controlling means which performs control so as to cause the printer to carry out a printing operation set by the setting means when the cumulative number of new printed sheets exceeds the upper limit number of printed sheets, in accordance with the result of determination by the determining means.

[0007] In this configuration, the printing operations set by the setting means comprises: a first operation of

comparing the cumulative number of new printed sheets and the prescribed allowable value to determine whether or not the former exceeds the latter, and determining whether or nor the printing operation is to be continued in accordance with the result of the comparison; or a second operation of unconditionally discontinuing the printing operation; or a third operation of conducting the printing operation by changing the printing mode leading to a decrease in the consumption of recording medium.

[0008] The printing mode should preferably include a mode of reducing an image to be printed in size in a page on the recording medium and printing a plurality of images in a page of the recording medium.

[0009] The printer system should preferably further comprise comparing means for comparing the processing capability of the printer and the number of printed sheets required when conducting printing in accordance with the printing instruction; and selecting means for selecting whether or not printing according to the printing instruction pursuant to the result of comparison by the comparing means is to be continued, or discontinued.

[0010] Another embodiment relates to a print controlling method in a printer system in which a host and a printer are mutually connected via a network, comprising a storing step of storing the upper limit number of printed sheets that the

printer is allowed to print and the cumulative number of printed sheets to the present for each user of the printer system; a setting step of setting in advance printing operations to be carried out when the cumulative number of new printed sheets determined from the number of printing runs conducted in the new printing operation exceeds the upper limit number of printed sheets; a reception step of receiving a printing instruction from the host; a determining step of determining whether or not the cumulative number of new printed sheets exceeds the upper limit number of printed sheets when conducting printing according to the printing instruction, on the basis of the upper limit number of printed sheets and the cumulative number of printed sheets; and a controlling step of performing control so as to carry out the printing operations set in the setting step when the cumulative number of new printed sheets exceeds the upper limit number of printed sheets, in accordance with the result of determination made in the determining step.

[0011] Still another embodiment relates to a computer-readable memory which stores a print controlling program executed in a printer system in which a host and a printer are mutually connected via a network, comprising a code executing previously set processing the printing operation to be carried out when the cumulative number of new printed

sheets determined from the number of new printing runs exceeds the upper limit number of printed sheets, on the basis of the upper limit number of printed sheets that the printer is allowed to print and the cumulative number of printed sheets to the present for each user of the printer system stored in a prescribed recording medium; a code which receives a printing instruction from the host; a code which executes processing of determining whether or not the cumulative number of new printed sheets exceeds the upper limit number of printed sheets when carrying out printing in accordance with the printing instruction on the basis of the upper limit number of printed sheets and the cumulative number of printed sheets; and a code which executes processing of conducting control so as to carry out the set printing operation when the cumulative number of new printed sheets exceeds the upper limit number of printed sheets, in accordance with the result of the determination.

[0012] In the present invention having the above-mentioned configuration, the upper limit number of printed sheets that the printer is allowed to print and the cumulative number of printed sheets to the present for each user of the printer system are stored, and printing operations to be carried out when the cumulative number of new printed sheets determined from the number of new printing runs exceeds the upper limit number of printed sheets are previously set. Upon receipt

of a printing instruction from the host, and when conducting printing in accordance with the printing instruction, it is determined whether or not the cumulative number of new printed sheets exceeds the upper limit number of printed sheets, control is performed so as to execute the printing operation set in advance.

[0013] Further another embodiment relates to a printer system in which a host and a printer are mutually connected via a network, comprising reception means which receives a printing instruction from the host; memory means which stores the upper limit number of printed sheets that the printer is allowed to print and the cumulative number of printed sheets to the present, for each user; comparing means which, prior to executing the printing instruction, compares the upper limit number of printed sheets and the cumulative number of printed sheets to the present; and display means which does not execute the printing instruction when the cumulative number of printed sheets is determined, as a result of the comparison, to exceed the upper limit number of printed sheets, and displays a message to the effect that printing is not executable.

[0014] The comparing means in this case should preferably further compare the upper limit number of printed sheets and the cumulative number of new printed sheets obtained when conducting printing in accordance with the printing

instruction; and display means which does not execute the printing instruction when the cumulative number of printed sheets is determined, as a result of the comparison, to exceed the upper limit number of printed sheets, and displays a message to the effect that printing is not executable.

[0015] Another embodiment relates to a print controlling method in a printer system in which a host and a printer are mutually connected via a network, comprising a storing step of storing the upper limit number of printed sheets that the printer is allowed to print and the cumulative number of printed sheets to the present for each user of the printer system; a reception step of receiving a printing instruction from the host; a comparing step of comparing, prior to executing the printing instruction, the upper limit number of printed sheets and the cumulative number of printed sheets to the present; and a displaying step of not executing the printing instruction when the cumulative number of printed sheets is determined, as a result of the comparison, to exceed the upper limit number of printed sheets, and displaying a message to the effect that printing is not executable.

[0016] Another aspect of the invention relates to a computer-readable memory which stores a print controlling program executed in a printer system in which a host and a



printer are mutually connected via a network, comprising a code executing processing of storing the upper limit number of printed sheets that the printer is allowed to print and the cumulative number of printed sheets to the present for each user of the printer system; a code executing processing of receiving a printing instruction from the host; a code executing processing of comparing, prior to executing the printing instruction, the upper limit number of printed sheets and the cumulative number of printed sheets to the present; and a code executing processing of not executing the printing instruction when the cumulative number of printed sheets is determined, as a result of the comparison, to exceed the upper limit number of printed sheets, and displaying a message to the effect that printing is not executable.

[0017] In the present invention having the above-mentioned configuration, the upper limit number of printed sheets that the printer is allowed to print and the cumulative number of printed sheets for each user of the printer system are stored in advance. Upon receipt of a printing instruction from the host, the upper limit number of printed sheets is compared with the cumulative number of printed sheets to the present, and when the cumulative number of printed sheets to the present is determined, as a result of this comparison, to exceed the upper limit number of printed sheets, the

printing instruction is not executed, and a message to the effect that printing is not executable is displayed.

[0018]

[Embodiments] Preferred embodiments of the present invention will now be described in detail with reference to the attached drawings.

[0019] Fig. 1 is a block diagram illustrating the configuration of the printer system, a typical embodiment of the present invention.

[0020] As shown in Fig. 1, this printer system comprises an image processor 1000, a personal computer (PC) 11, and a workstation (WS) 12 mutually connected. To simplify the explanation, Fig. 1 shows a configuration comprising one image processor, one personal computer (PC) 11, and one workstation (WS) 12 connected. A plurality of the individual units may be connected to the printer system.

[0021] The image processor 1000 has a reader section 1 which reads the original image, a printer 2 which records the image on a recording medium, and an image input/output controller 3 which performs input/output via a telephone line or a network 100, and enters image data from the reader section and outputs the image data to a printer section 3. The reader section 1 can transfer input image data directly to the printer section 3. The printer section 3 enters image data directly from the reader section 1, or enters

image data from the image input/output controller 3.

[0022] When the image processor 1000 is connected to a plurality of systems, it is not necessary that the printer section 3 and the reader section 2 have uniform functions and capabilities, which may be different from each other.

[0023] As shown in Fig. 1, the image input/output controller 3 comprises a facsimile section 4, a file section 5, a magneto-optical disk unit 6, a computer interface section 7, an LIPS formatter section 8, a post-script (PS) formatter section 9, and a core section 10. These components will now be described.

[0024] The facsimile section 4 expands compressed image data received via a telephone line, transfers the expanded image data to the core section 10, compresses the image data transferred from the core section 10, and transmits the compressed image data to the destination of communication via a telephone line.

[0025] The large-capacity magneto-optical disk drive unit 6 is connected to the file unit. The file unit 5 compresses the image data transferred from the core section 10, stores the compressed image data in the magneto-optical disk set in the magneto-optical disk drive unit 6, together with a keyword for retrieving the image data, retrieves the compressed image data stored in the magneto-optical disk on the basis of the keyword transferred via the core section 10,

expands the retrieved compressed image data read out, and transfers the expanded image data to the core section 10.

[0026] The computer interface section 7 serves as an interface with the personal computer (PC) 11 or a workstation (WS) 12 connected via the network 100. The personal computer (PC) 11 and the workstation (WS) 12 play the role of a network server in the printer system, serves as a nucleus of network control, or as a unit for storing image data outputted to the printer section 2. The LISP formatter section 8 described in LISP language and the PS formatter section 9 described in post script interprets PDL data transferred from the personal computer (PC) 11 or the workstation (WS) 12, converts data by the printer section 2 into recordable image data for bit-map-depression.

[0027] The core section 10 controls the flow of data among the reader section 1, the facsimile section 4, the file section 5, the computer interface section 7, the LISP formatter section 8 and the PS formatter section 9. The configuration and operations of the core section 10 will be described later in detail.

[0028] Fig. 2 is a side sectional view illustrating the configuration of the reader section 1 and the printer section 2. The printer section 2 forms an image in accordance with the electrophotographic method.

[0029] An automatic document feeder (ADF) of the reader

section 101 feeds an image original based thereon sequentially from the last page (the lowermost sheet) one by one onto a platen glass 102. After the completion of reading of the original, the original on the platen glass 102 is discharged. When the original is conveyed onto the platen glass 102, a lamp 103 is turned on to start displacement of the scanner unit 104, and the original is scanned for exposure. The light reflected from the original is guided by mirrors 105, 106 and 107 and a lens 108 to a CCD image sensor (hereinafter referred to as the "CCD") 109. The thus scanned image of the original is read by the CCD 109. After a prescribed signal processing, the image data outputted from the CCD 109 is transferred to the printer section 2 or to the core section 10 of the image input/output controller 3.

[0030] A laser driver 221 provided in the printer section 2 drives a laser emitter 201 of, for example, a semiconductor laser, and a laser beam is emitted in response to the image data outputted from the reader section 1. When the laser beam is irradiated onto a photosensitive drum 202, an electrostatic latent image corresponding to the laser beam is formed on the photosensitive drum 202. A developing agent is deposited by a developing unit 203 onto the latent image portion of the photosensitive drum 202.

[0031] On the other hand, a recording medium such as a

recording paper is fed from a cassette 204 or a cassette 205 at a timing synchronized with the start of irradiation of the laser beam to transfer the recording medium to the transfer section 206, and the developing agent deposited onto the photosensitive drum 202 is transferred to the recording paper. The recording paper onto which the developing agent is transferred is conveyed to the fixing section 207, and the developing agent is fixed to the recording paper under the effect of heat and pressure of the fixing section 207. The recording paper having passed through the fixing section 207 is discharged outside the printer section 2 by a discharge roller 208. A sorter 220 sorts the recording sheets of paper by housing discharged recording sheets in individual bins. When sorting is not instructed, the sorter 220 houses the recording sheets into the top bin.

[0032] When recording to two sides is instructed, the recording paper which recording has been conducted onto one side is conveyed to the discharge roller 208. Therefore, the discharge roller is reversely rotated to guide the recording paper by a flapper 209 to a refeed conveying path 210. When multiple recording is instructed, the recording paper is guided by the flapper 209 to the refeed paper conveyance path 21- so that the recording paper is not conveyed to the discharge roller 208. The recording paper

guided to the refeed paper conveyance path 210 is fed again to the transfer section 206 the above-mentioned timing.

[0033] The printer system 2 may be of a type which performs printing by the ink-jet method, not the electrophotographic type as described above.

[0034] Fig. 3 is an exterior perspective view illustrating an outline of the configuration of an ink-jet printer IJRA. In Fig. 4, a carriage HC engaging with a spiral groove 5004 of a lead screw 5005 which rotates via driving force transmitting gears 5009 to 5011 in conjunction with positive and negative rotations of a driving motor 5013 has a pin (not shown) and reciprocates in the arrow a and b directions while being supported by a guide rail 5003. An integral type ink-jet cartridge IJC having a built-in recording head IJH and ink tank IT is mounted on a carriage HC. Reference numeral 5002 represents a paper pressing plate which presses the recording paper P against a platen 5000 in the travelling direction of the carriage HC; 5007 and 5008 represent photo-couplers serving as home position detectors for switching over the rotating direction of a motor 5013 through confirmation of a carriage lever 5006 in this region; 5016 represents a member which supports a capping member 5022 which caps the front of the recording head IJH; 5015 represents a sucking machine which sucks the interior of this cap, restoring suction of the recording head via an

opening 5023 in the cap; 5017, a cleaning blade; 5019, a member which makes the blade movable in the front-rear direction; these members are by a main body supporting plate 5018; not this type of blade, but a publicly known cleaning blade is of course applicable in this embodiment; 5021, a lever for starting suction for starting restoration of suction, which moves along with the displacement of a cam 5020 engaging with the carriage, and the displacement is controlled by a known transmitting medium such as clutching of the driving force from a driving motor.

[0035] The configuration of these capping, cleaning and suction restoration is such that desired processing can be achieved at a corresponding position under the effect of the lead screw 5005 when the carriage reaches the region on the home position side. Any method is applicable in this embodiment so far as a desired action is performed at a known timing.

[0036] Fig. 4 is a block diagram illustrating the functional configuration of the reader section 1.

[0037] The analog image data outputted from the CCD 109 is subjected to A/D conversion at the S/D-SH section 110 to convert the analog data into digital image data and to apply shading correction. The image data processed through the A/D-SH section 110 is transferred to the printer section 2 via the image processing section 111, and transferred to the



core section 10 of the image input/output controller 3 via an interface section (I/F) 113.

[0038] A CPU 114 controls the image processing section 111 and the interface section (I/F) 113 in response to the contents of an instruction from an operating section 115. For example, when instructed to perform execution in a copying made in which copying is conducted through trimming from the operating section 115, trimming is performed in the image processing section 111, and image data obtained as a result is transferred to the printer section 2. When instructed to execute the facsimile transmission made from the operating section 115, the instructed image data and the control command corresponding to the instructed mode from the interface section (I/F) 113 are transferred to the core section 10. This processing is achieved by reading out a control program stored in the memory 116 by the CPU 114, and using a part of the memory 116 as a work area for execution of the program.

[0039] Fig. 4 is a block diagram illustrating the configuration of the core section 10.

[0040] The image data transferred from the reader section 1 is received by the interface section (I/F) 122, the transferred to the data processing section 121, and the control command transferred from the reader section 1 is transferred to the CPU 123. The data processing section 121

executes image processing such as image rotating processing and magnification change processing. The image data transferred from the reader section 1 to the data processing section 121 is transferred to the facsimile section 4, the file section 5, or the computer interface section 7 via the interface section (I/F) 120, in response to the control command transferred from the reader section 1.

[0041] The code data expressing the image entered via the computer interface section 7 is received by the interface section (I/F) 120, and the transferred to the data processing section 121, where it is determined whether or not the code data is a PDL data described in LIPS or the PostScript. The PDL data is transferred again to the LIPS formatter section or the PS formatter section 9 via the interface section (I/F) 120. The LIPS formatter section 8 or the PS formatter section 9 interprets the PDL data on the basis of the respective descriptive languages and expand into image data. The expanded image data is transferred again to the data processing section 121, and then transferred to the facsimile section 4 and the printer section 2.

[0042] The expanded image data received from the facsimile section 4 via the interface section 120 is transferred to the data processing section 121 via the interface section (I/F) 120 to the printer section 2, the file section 5, and

the computer interface section 7. The image data from the file section 5 is transferred to the data processing section 121, and then transferred to the printer section 2, the facsimile section 4, and the computer interface section 7.

[0043] Transfer control described above is executed by the CPU 123 in accordance with the control program stored in the memory 124 and the control commands transferred from the reader section 1. The memory 124 serves also as a work area of the CPU 123.

[0044] A database called MIB (Management Information Base) is built in the computer interface section 7, so that the printer is controllable by communicating with the personal computer on the network or a computer such as a workstation via the SNMP protocol. The printer can be administered by setting the upper limit number of printed sheet that the printer is allowed to print for each prescribed ID, the optimum number of printed sheets printed by one printing instruction and other conditions from a personal computer or a workstation connected to the operating section 115 or the network 100. Control is also possible by summing up the number of printed sheets for each run of printing, and comparing the cumulative number of printed sheets with the set value for each run of printing.

[0045] In the printer system of this embodiment, as described above, it is possible to carry out a composite

processing combining various functions including reading of the original image, printing of an image, transmission and receiving of the image, storing of the image, and data input/output into/from the computer, centering around the core section 10.

[0046] The print control processing executed in the printer system having the above-mentioned configuration will now be described with reference to the flowchart shown in Fig. 6.

[0047] In step S1, the printer system (hereinafter referred to as the "system") operator enters a printing instruction for causing the printer system to print documents from the personal computer 11 or the workstation 12. Then in step S2, software known as the print driver is started upon input of this instruction, and further in step S3, PDL data are prepared, and a control program causing the following actions is started.

[0048] In step S4, the print driver prepares PDL data, and on the other hand, the print control program retrieves the MIB provided in the computer network section 7 of the image input/output control section 3 via the network 100, to collect information of the image processor 1000.

[0049] In step S5, the number of printed sheets summed up for each ID, allocated to each operator or each personal computer (PC) or each workstation is checked up. More specifically, information including the cumulative number of

printed sheets to the present (AP) is retrieved on the basis of the information obtained from the MIB in step S4, and the obtained information is collated with the number of printed sheets available from the data prepared by the print driver, presence of two-side printing, presence of sorting, and presence of stable processing.

[0050] At this point in time, the maximum number of printed sheets predetermined for that ID (MAXP) and the cumulative number of printed sheets (AP) are checked. If  $MAXP \geq AP$ , it is determined that the upper limit prescribed for that ID has already been reached, and the processing based on the printing instruction entered in step S1 is discontinued.

The process advances to step S13, and a message to the effect that printing is not executable is displayed on the display screen of the personal computer (PC) used by the operator or the workstation (WS) (not shown), thus completing the processing.

[0051] In contrast, if  $MAXP < AP$ , the processing advances to step S6. In step S6, it is determined whether or not the upper limit selected during printing of the printing instruction is exceeded by the total of the cumulative number of printed sheets (AP) and the number of printed sheets printed in accordance with the printing instruction in step S1 (RP). The upper limit selected during printing is reached when  $AP + RP > MAXP$ . Then, the processing

advances to step S7. If  $AP + RP \leq MAXP$ , the printing is determined to be executable as instructed, and the processing goes to step S8.

[0052] In step S7, any of the following operations set in advance by the system manager or a general operator (user) is carried out.

(1) As for the printing instruction entered in step S1, the number of printed sheets is further compared with the upper limit value (SMAXP), and printing operation is conducted in response to the result of this comparison, or, it is determined whether or not execution of the printing instruction is to be discontinued. For example, printing is executed if  $MAXP + SMAXP > AP + RP$ , and the execution of the printing instruction is interrupted if  $MAXP + SMAXP \leq AP + RP$ . The upper limit value (SMAXP) is a value how far it is allowed to exceed the maximum number of printed sheets (MAXO) during execution of the printing instruction.

(2) Discontinuing execution of printing instruction: In this case, processing advances to step S13.

(3) Forcedly changing the printing mode and conducting the printing operation.

[0053] Printing is usually performed only on one side of the recording paper of a specified size. In this case, the printing mode is changed to the 2in1 mode (mode in which images for two pages are printed on a page) or 4in1 mode

(mode in which images for four pages are printed on a page), or to the two-side printing mode so as to reduce the number of recording sheets of paper used for printing. In this case, as required, the printer driver re-prepares PDL data in the new mode. This change of printing mode should be set in advance in the system by the system manager or the general operator (user).

[0054] After execution of the processing as described above, the processing goes to step S8.

[0055] In step S8, the functions and capabilities of the printer section are checked up as to whether or not the printing operation according to the printing instruction entered in step S1 is executable. For example, when the two-side printing is specified in the printing instruction, it is determined whether or not the printer section has such a function.

[0056] When the printer section is confirmed to have such a function, the process advances to step S10. In contrast, when the printer section does not have such a function, the printing operation is changed so as to carry out any of the following operations set in advance by the system manager, or the general user. (1) the printing operation is discontinued; (2) changing the printing mode (for example, to the single-side printing mode). When discontinuance of the printing operation is decided, the process goes to step

S13. When it is determined to change the printing mode, the process advances to step S9, in which a message to this effect is displayed on the display screen (not shown) of the personal computer (PC) or the workstation (WS) used by the operator, and the process then goes to step S10.

[0057] Further in step S8, it is determined whether or not printing can be completed within an appropriate period of time by comparing the processing capability per minute (PPM) of the printer section and the number of printed sheets (RP). For example, if the print request covers 100 sheets while the printer section has a printing capability of 5 PPM, completion of processing would require about 210 minutes, and this cannot be considered an appropriate printing time. In this system of this embodiment, an optimum upper limit number of printed sheets for one printing instruction (OPTMAX) is set in advance by considering the processing capability of the printer section in the MIB by the system manager, this value is compared with the number of printed sheets (RP), and a processing in response to the result of comparison is applied.

[0058] In this case, if  $\text{OPTMAX} \leq \text{RP}$ , the process advances to step S10. If  $\text{OPTMAX} > \text{RP}$ , the process advances to step S9: a warning message is displayed. the printing instruction is reissued to the other printers connected to the system in step S9, or processing is continued without changing. In



this selection, when the operator decides to use another printer, the process returns to step S1. If the operator decides to continue processing, the process goes to step S10.

[0059] In step S10, it is checked whether or not the printer section is changing dynamically, for example, during copying, or paper jam is caused.

[0060] In this case, when the cassette 204 or the cassette 205 of the printer section 2 contains not recording paper, or when impossibility to process of a required number of printed sheets is predicted because of the small amount of remaining recording sheets, or when printing instruction was issued by the request in the staple mode, and output sheets are remaining before the tray of the sorter 220, or when paper jam occurs somewhere in the conveying path of the recording paper of the printer section, if any of these states is detected, the process goes to step S11, and the current status is shown, and a warning message urging the operator to take appropriate actions (for example, replenishment of recording sheets, removal of recorded sheets, or removal of paper jam) is displayed. The process goes to step S11A, execution is inhibited until the phenomenon preventing these printing operations is solved. After elimination of such a phenomenon, the process advances to step S12.

[0061] When it is determined that copying of a large volume

of original is in execution, and image originals in a large volume are being read from the reader section 1 on the basis of the set number of copied sheets entered from the operating section 15, the process advances to step S11B, in which a message to this effect is displayed, and further in step S11C, the system is caused to re-issue a printing instruction to the other printers, or continue processing. In this selection, if the operator decides to use the other printer, the process returns to step S1, and if he (she) decides to continue the processing, the process advances to step S12.

[0062] In step S12, the prepared PDL data is transferred to the image processor 1000 via the network, and printed by using the print section 2.

[0063] According to the embodiment described above, when a printing instruction is entered, the maximum number of printed sheets (MAXP), the upper limit number of printed sheets (SMAXP) set in advance in the system, the cumulative number of printed sheets for each ID (AP), and the number of printed sheets based on the printing instruction are checked. If the maximum number of printed sheets (MAXP) set upon execution of the printing instruction is exceeded, it is possible to obtain an appropriate print output through processing carried out by executing processing set in advance in the system.

[0064] By checking the functions, capabilities and current operations of the printer are checked up prior to executing the printing instruction, changing the printing mode in response thereto, requesting the operator to make a determination, or holding back processing, it is possible to achieve appropriate print output.

[0065] The present invention is applicable to a system comprising a plurality of components (for example, host computers, interface units, readers, printers), or to a device comprising single device (for example, a copying machine, a facsimile machine).

[0066] It is needless to mention that the object of the present invention is achievable also by supplying a memory medium storing the software program code implementing the functions of the above-mentioned embodiment, and reading out and executing the program code stored in the memory medium of the computer (or CPU or MPU).

[0067] In this case, the program code itself read out from the memory medium realizes the above-mentioned functions of the embodiment, and the memory medium storing the program code is a component of the present invention.

[0068] Applicable memory media for supplying the program code include floppy disks, hard disks, optical disks, magneto-optical disks, CD-ROM, CD-R, magnetic tapes, non-volatile memory cards, and ROM.

[0069] By executing the program code read out by the computer, it is of course possible not only to achieve the above-mentioned functions of the embodiments described above, but also to cause the OS (operating system) operating on the computer to take charge of all or part of actual processing in accordance with the instructions of the program code, and this include cases where the functions of the above-mentioned embodiments are achieved through this processing.

[0070] Applicable cases of course include the case where the functions of the above-mentioned embodiment are achieved by writing the program codes read out from the memory medium connected to a function expanding board inserted into the computer or in a memory provided in an expanded function board, and then a CPU or the like provided in the function expanding board or the function expanding unit performs all or part of the actual processing.

[0071]

[Advantages] According to the present invention, as described above, the printing operations to be carried out when the cumulative number of new printed sheets determined from the number of new printing runs exceeds a prescribed upper limit number of printed sheets are set in advance, and when printing is performed in accordance with a printing instruction from the host on the basis of the prescribed upper limit number of printed sheets and the cumulative

number of printed sheets, and if the cumulative number of new printed sheets is determined to exceed the upper limit number of printed sheets, control is applied so that the printing operation is continued if the result does not exceed a prescribed allowable value, or the printing operation is carried out by changing the printing mode so as to achieve a reduced consumption of recording medium. Stopping of print output during printing is prevented, and the user can more easily use the printer system.

[0072] According to another embodiment of the present invention, the prescribed upper limit number of printed sheets is compared to the cumulative member of printed sheets to the present prior to executing the printing instruction from the host. If the cumulative number of printed sheets to the present is determined to exceed the upper limit number of printed sheets, the printing instruction is not executed, and a message to the effect that printing is not executable is displayed. This provides the user with information about the current status of system management, to permit easier utilization of the printer system.

[0073]

[Brief Description of the Drawings]

[Fig. 1] Fig. 1 is a block diagram illustrating the configuration of the printer system of a typical embodiment

of the present invention.

[Fig. 2] Fig. 2 is a side sectional view of the reader section 1 and the printer section 2.

[Fig. 3] Fig. 3 is a perspective view illustrating the configuration of the printer section which performs recording by the ink-jet method.

[Fig. 4] Fig. 4 is a block diagram illustrating the configuration of the reader section 1.

[Fig. 5] Fig. 5 is a block diagram illustrating the configuration of the core section 10.

[Fig. 6] Fig. 6 is a flowchart showing print control processing.

[Reference Numerals]

- 1: Reader section
- 2: Printer section
- 3: Image input/output controller
- 4: Facsimile section
- 5: File section
- 6: Magneto-optical disk drive unit
- 7: Computer interface section
- 8: LISP formatter section
- 9: PS formatter section

FIG. 1

1: READER SECTION  
2: PRINTER SECTION  
4: FACSIMILE SECTION  
5: FILE SECTION  
6: MAGNETO-OPTICAL DISK DRIVE UNIT  
7: COMPUTER INTERFACE SECTION  
8: LIPS FORMATTER SECTION  
9: PS FORMATTER SECTION  
10: CORE SECTION  
TELEPHONE LINE

FIG. 4

(1) TO CORE SECTION  
(2) TO PRINTER SECTION  
111: IMAGE PROCESSOR  
115: OPERATING SECTION  
116: MEMORY

FIG. 5

(1) FROM READER SECTION 1  
(2) TO PRINTER SECTION 2  
4: FACSIMILE SECTION  
5: FILE SECTION  
7: COMPUTER INTERFACE SECTION

8: LIPS FORMATTER SECTION  
9: PS FORMATTER SECTION  
121: DATA PROCESSOR  
124: MEMORY

FIG. 6

S1: PRINTING INSTRUCTION  
S2: START DRIVER  
S3: START PRINT CONTROL PROGRAM  
S4: REFER TO MIB

(1) OVER UPPER LIMIT

S5: NUMBER OF SHEETS/MODE

(2) UNDER UPPER LIMIT

S6: NUMBER OF SHEETS

(4) EXCEEDING

(3) EXCEEDS

S7: 1. CHECK UPPER LIMIT  
2. STOP (ADVANCE TO STEP S13  
3. CHANGE MODE

(5) PRINTING PROHIBITED

S8: CHECK FUNCTIONS?

(6) CHANGE MODE

(7) INSUFFICIENT CAPABILITIES

(8) PRINTING ALLOWED

S9: DISPLAY



S9A: DISPLAY WARNING MESSAGE

S9B: PROCESSING CONTINUED?

S10: STATE CHECKED?

S11: DISPLAY WARNING MESSAGE

S11B: DISPLAY WARNING MESSAGE

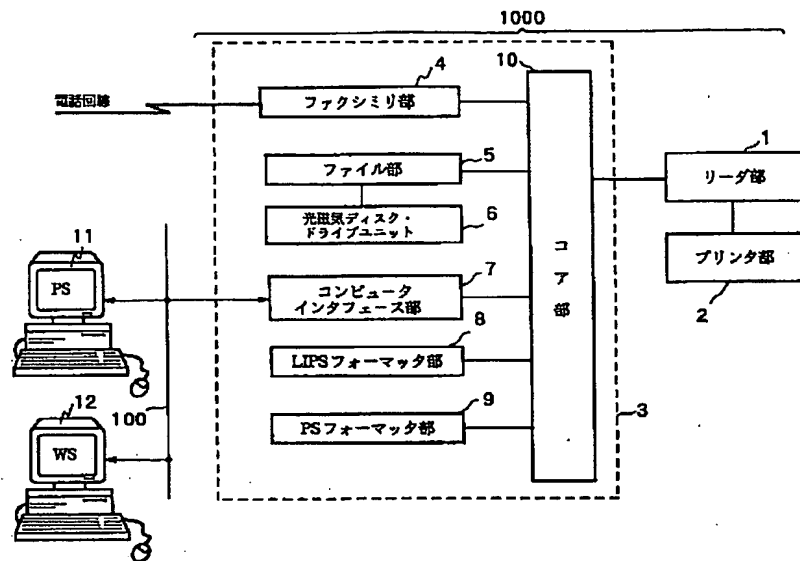
S11A: WAITING FOR PROCESSING

S11C: PROCESSING CONTINUED

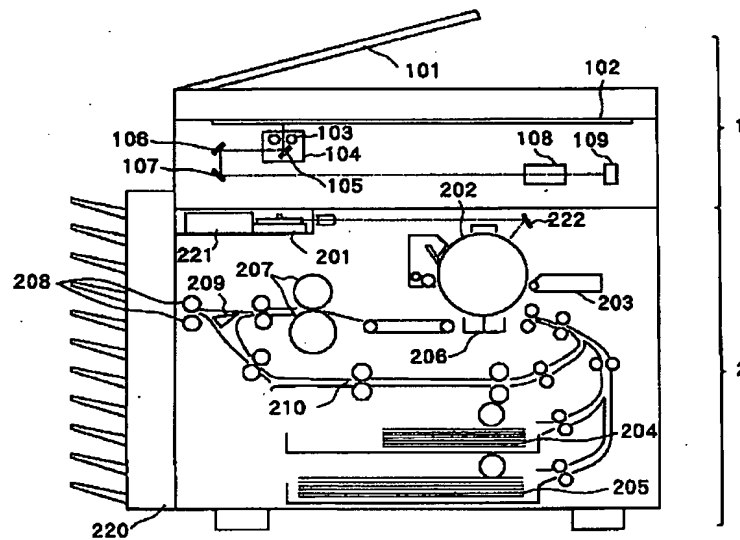
S13: DISPLAY MESSAGE

S12: PRINT

【図1】



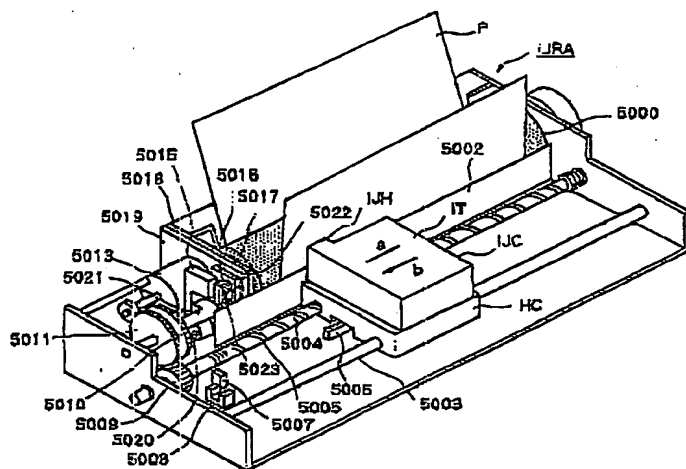
【図2】



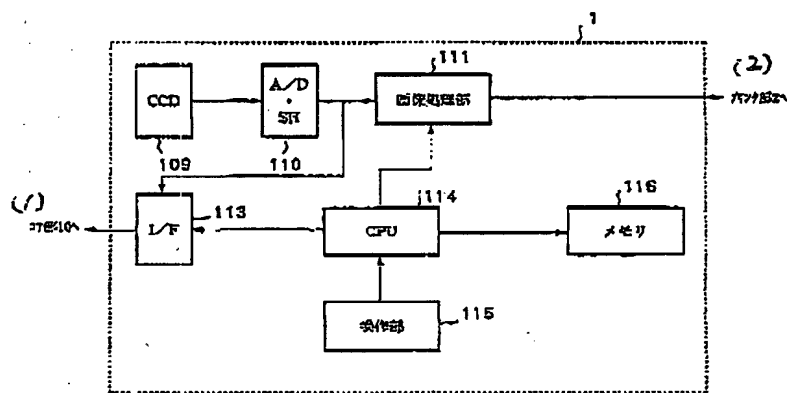
(11)

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【図3】



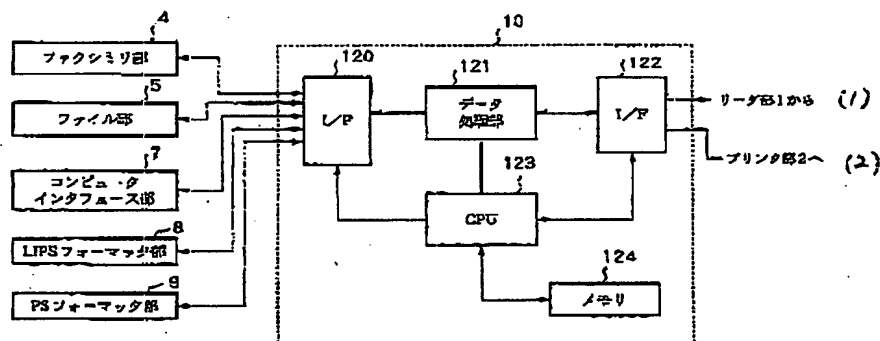
【図4】



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【図5】



【図6】

